# AN INTERNAL STRUCTURE IN THE CYRTACANTHACRINÆ (ORTHOPTERA, ACRIDIDÆ) OF POSSIBLE TAXONOMIC VALUE.

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In 1899 Comstock and Kellogg described rounded pouches of a reddish color lying on either side of the vagina (median oviduct) in *Melanoplus femur-rubrum.* These pouches, they stated, open below the ventral valves of the ovipositor and in fresh specimens can be everted by pressure. Comstock and Kellogg did not determine their function but suggested that they might be glandular. A few years ago Vardé (1929, 1934), unaware of the earlier report of Comstock and Kellogg, described these same structures more completely in *Anacridium œgyptium, Calliptamus italicus, Pezotettix giornœ, Schistocerca paranensis, Schistocerca gregaria, Patanga succincta, Palaciosa khandalensis* and a species of *Podisma,* and suggested that the pouches may be a distinct subfamily characteristic. Snodgrass (1935) has since noted the presence of these organs in Melanoplus and has pictured them for *Melanoplus femur-rubrum.* He mentions the 1929 paper of Vardé but does not refer to Comstock and Kellogg.

Vardé devised the name oviducal vesicles (vésicules oviductaires) for these structures because of their proximity to the oviduct. This name is not particularly appropriate since it suggests that they are a part of the oviduct whereas actually they are quite distinct from it.

During the present study fifty-five species of Acrididæ, belonging to four subfamilies, have been examined, as follows:

### Acridinæ

*Ageneotettix deorum*
*Chloealtis conspersa**
*Chorthippus longicornis**
*Dichromorphia viridis*
*Eritettix simplex simplex**
*Mermiria maculipennis macclungi**
*Mermiria neomexicana**
*Opeia obscura**
*Orphulella speciosa**
*Pseudopomala brachyptera**
*Syrbula admirabilis*

### Oedipodinæ

*Arphia pseudonietana**
*Arphia sulphurea*
*Arphia xanthoptera*
*Camnula pellucida**
*Chortophaga viridifasciata**
*Dissosteira carolina*
*Encoptolophus sordidus sordidus*
*Hadrotettix trifasciatus*
*Hippiscus rugosus*
*Pardalophora apiculata**
*Pardalophora haldemanii**
*Psinidia fenestralis fenestralis*
*Scirtetica marmorata marmorata*
*Spharagemon bolli*
*Trimerotropis citrina**
*Trimerotropis maritima maritima*
*Trachyrhachis kiowa fuscifrons**
*Trachyrhachis kiowa kiowa**

### Pyrgomorphinæ[1]

*Ichthydion mexicanum**
*Sphenarium sp.**

### Cyrtacanthacrinæ

*Campylacantha olivacea olivacea*
*Hesperotettic viridis pratensis**
*Hypochlora alba*
*Melanoplus angustipennis*
*Melanoplus bivittatus*
*Melanoplus confusus**
*Melanoplus dawsoni**
*Melanoplus differentialis*
*Melanoplus femur-rubrum rubrum*
*Melanoplus flavidus flavidus*
*Melanoplus fœdus fluviatilis*
*Melanoplus gladstoni*
*Melanoplus gracilis**
*Melanoplus keeleri luridus*
*Melanoplus mexicanus mexicanus*
*Melanoplus packardii**
*Melanoplus scudderi scudderi*
*Melanoplus viridipes viridipes**
*Melanoplus walshii*
*Paroxya sp.**
*Phœtaliotes nebrascensis*
*Romalea microptera*
*Schistocerca alutacea*
*Schistocerca americana americana*

The glandular pouches of Comstock and Kellogg have been found to be present in all members of the Cyrtacanthacrinæ listed above and absent in all species of the other three subfamilies.

In most of the grasshoppers which possess them the pouches are conspicuous because of the pigment which they contain. The color observed immediately after the abdomen had been opened is given below for a number of species.

The pouches of four species—*Melanoplus differentialis, Romalea microptera, Schistocerca alutacea* and *Schistocerca*

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[1] Dr. Eleanor Carothers very kindly gave us specimens of this subfamily for examination.

| SPECIES | COLOR OF GLANDULAR POUCHES IN LIVING CONDITION |
|---|---|
| *Campylacantha olivacea olivacea* | brown |
| *Hypochlora alba* | orange brown |
| *Melanoplus angustipennis* | nearly colorless |
| *Melanoplus bivittatus* | reddish brown |
| *Melanoplus differentialis* | red |
| *Melanoplus flavidus flavidus* | orange brown |
| *Melanoplus fœdus fluviatilis* | light brown |
| *Melanoplus gladstoni* | dark red |
| *Melanoplus keeleri luridus* | brown |
| *Melanoplus mexicanus mexicanus* | light reddish brown |
| *Melanoplus scudderi scudderi* | light brown |
| *Melanoplus walshii* | light brown |
| *Phœtaliotes nebrascensis* | brown |
| *Schistocerca alutacea* | light brown |
| *Schistocerca americana americana* | very light brown |

*americana*—were studied cytologically. Various fixatives (Allen's, Bouin's, Carnoy-Lebrun, Champy and Helly's) and a number of different stains (Ehrlich's hematoxylin with triosin, Giemsa, Heidenhain's iron-hematoxylin and Mallory's connective tissue) were tried. Champy fixation followed by 2 per cent osmic acid was also used. The results confirmed Vardé's observations in all respects and need not be repeated here. One point, however, seems worth noting. With Giemsa the secretion mass in the lumen of the pouch is seen to consist of innumerable thread-like ''casts'' of the intracellular canaliculi embedded in a lighter-staining homogeneous matrix. With other stains this differentiation into two components was not apparent.

In the case of the species marked on the foregoing pages with an asterisk dried specimens instead of fresh were examined. This can be done very readily by removing the tip of the abdomen and allowing it to soak for several hours in a 25 per cent solution of KOH. The softened muscles, trachea, etc., can then be pulled out and, after repeated washings in water the preparation is ready for examination. If the pouches are found to be present they may be removed, slit open and examined microscopically. The chitinous intima with the hundreds of minute canaliculi attached to, and which open through it can then be stained, dehydrated, cleared and mounted permanently if desired.

Vardé compares these pouches of the grasshopper to somewhat similar glands possessed by the *Bombyx mori* female. These are everted at the time of copulation and are thought to produce an odor attractive to the male. Those who handle grasshoppers in large numbers are sometimes aware of distinct odors produced by certain species. *Romalea microptera,* for example, gives off a strong odor which is noticeably unpleasant when the animals are confined in a small or poorly-ventilated container. It would be interesting to ascertain the source of this odor. Perhaps the glands of Comstock and Kellogg are responsible.

## SUMMARY

Of fifty-five species of Acrididæ examined all of the Cyrtacanthacrinæ, but none of the Acridinæ, Oedipodinæ or Pyrgomorphinæ were found to possess the glandular pouches described in *Melanoplus femur-rubrum* by Comstock and Kellogg.

## LITERATURE CITED

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